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AUTOMATED VEHICLE SCHEDULING (AVS) USER'S INSTRUCTION  
MANUAL FOR THE CDC. (U) DAVID W TAYLOR NAVAL SHIP  
RESEARCH AND DEVELOPMENT CENTER BET. R MELTON NOV 82  
DTNSRDC-82/108

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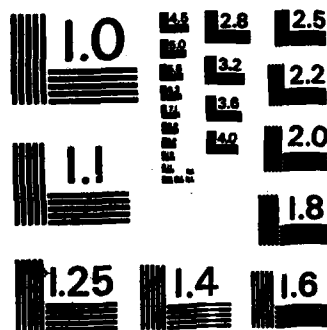
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# **DAVID W. TAYLOR NAVAL SHIP RESEARCH AND DEVELOPMENT CENTER**

Bethesda, Maryland 20084



## **AUTOMATED VEHICLE SCHEDULING (AVS) USER'S INSTRUCTION MANUAL FOR THE CDC 6000 SERIES COMPUTERS**

by

**R. Melton**

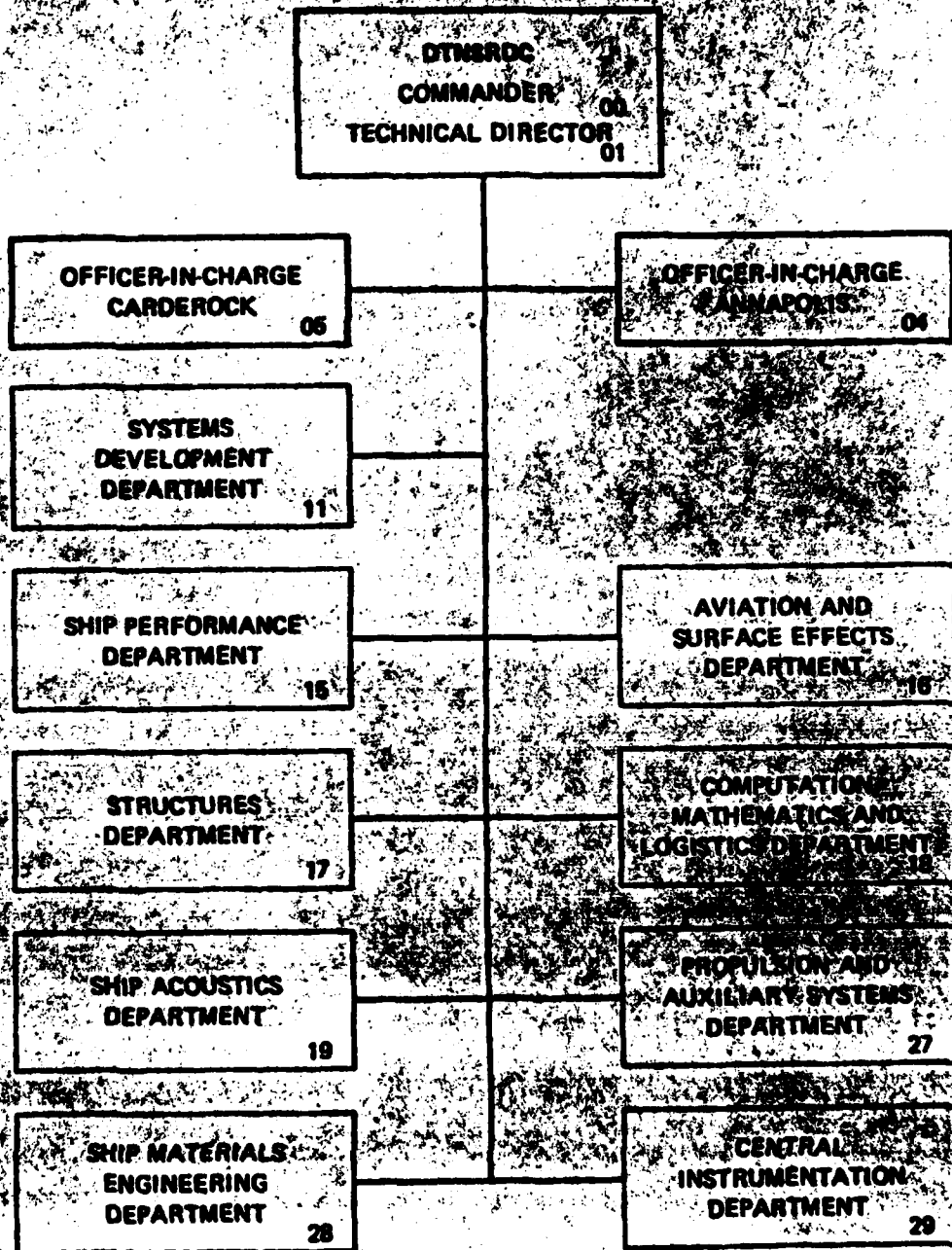
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**COMPUTATION, MATHEMATICS AND LOGISTICS DEPARTMENT  
RESEARCH AND DEVELOPMENT REPORT**

**November 1982**

**DTNSRDC-82/108**

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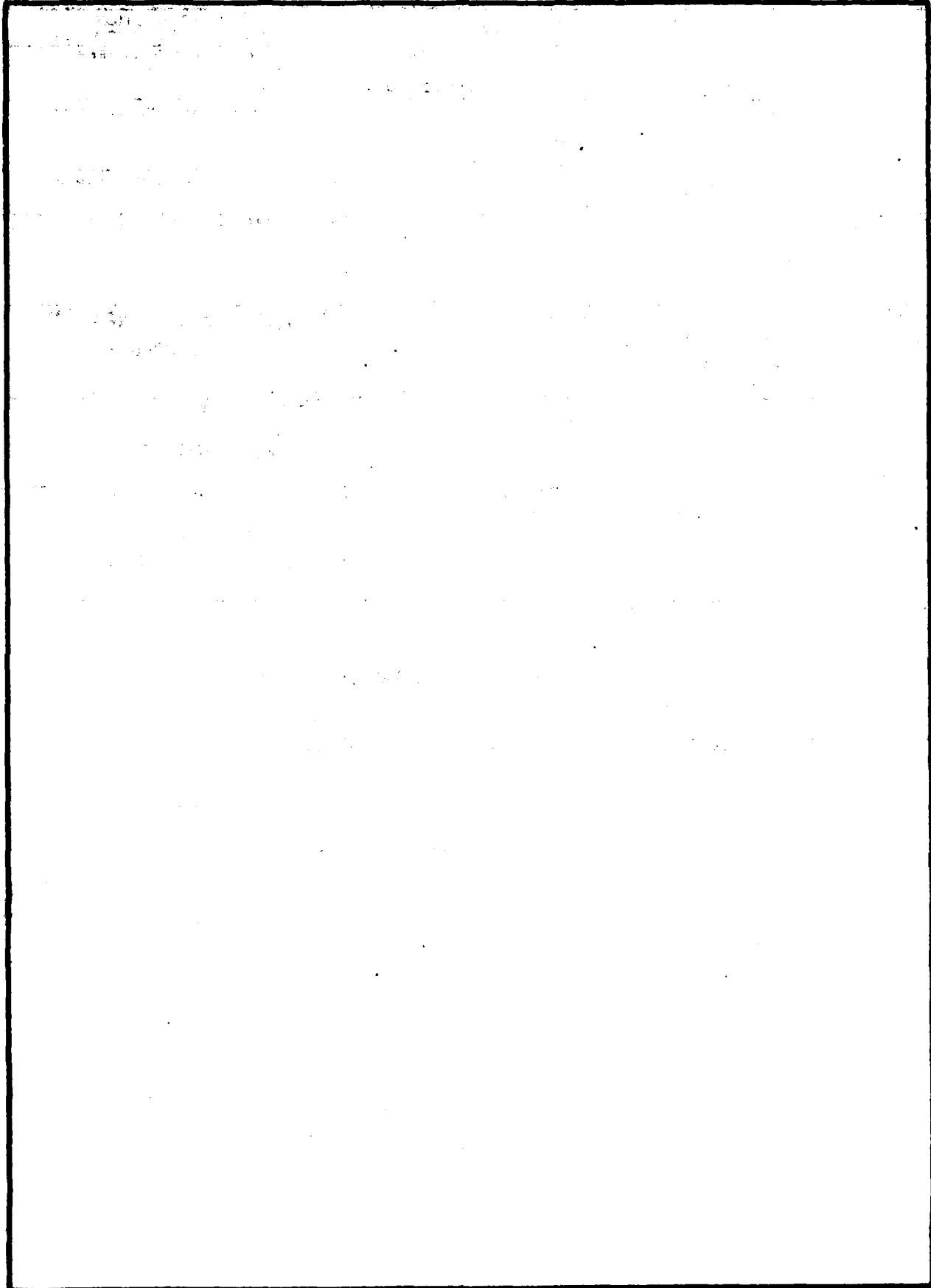
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## ABSTRACT

Automated Vehicle Scheduling (AVS) is a software package designed to assist in scheduling palletized cargo delivery to warehouses in a Navy Supply Center. The package consists of two programs which schedule regular and emergency orders.

## ADMINISTRATIVE INFORMATION

This project was authorized by the Naval Supply Systems Command with funding under Task Area 53/531/091.

## INTRODUCTION

Automated Vehicle Scheduling (AVS) is a software package designed to assist in scheduling palletized cargo delivery among warehouses in a Navy Supply Center (NSC). The package consists of the routines which schedule regular and emergency orders. It is written in FORTRAN IV and is designed to run on CDC 6000 series computers at DTNSRDC.

AVS can schedule up to 99 orders totalling about 2000 pallets among as many as 99 warehouses. Deliveries and/or pickups are made by as many as 50 vehicles of four general types: straddle trucks, transporter vehicles, tractor trailers, and industrial tractors. Routes are built to "maximum" efficiency within the limitations of the algorithm used.

The emergency order routine uses the routes prepared by the regular order routine to schedule servicing of emergency orders placed during the regular daily routine. An emergency order can include from 1 to 99 pallets; it can preempt regular orders if the dispatcher desires; it can be handled by a single vehicle type or by a mix of vehicles; and the vehicles selected to service it may be those used for regular orders, a subset of these, vehicles previously unused, or any combination of these vehicles. As many as 99 emergency orders may be considered in the same emergency order run.

For AVS to be successful, the programs must be easily usable by dispatch personnel who have had minimal computer training. In addition, the scheduling programs must execute rapidly to ensure fast response to orders. For these reasons, AVS is interactive, tutorial, and corrective. Program procedures,

execution instructions, and output file storage are simple. Data are requested from the user interactively and inputs are checked for validity. Instructions available to the user are printed at the terminal in a menu. Schedules are generated only after the user has checked the correctness of the data.

## BACKGROUND

Since the impetus for undertaking the AVS project came from NSC Charleston, the AVS programs described here address operations at that installation. Therefore, a brief description of Charleston's local delivery procedures is in order.

NSC Charleston includes 78 pick-up/delivery sites and eight piers, plus six off-base sites. Twenty or more of these sites are used in a typical half-day's schedule. The dispatch operation is run from building 1078. (A map of the Charleston complex is given in Figure 1; the warehouses are listed in the Table.)

Orders for palletized cargo movement fall into three priority classes. Group 3 orders are telephoned to the dispatcher twice a day: at 1100 and 1500 hours. Group 2 and Group 1 priority orders require service within 8 and 4 hours, respectively. They may be called in at any time, but in practice are usually phoned in at the same time as Group 3 orders. When orders are ready for shipment at the warehouses, the dispatcher is called to request transportation. At present the dispatch supervisor prepares the vehicle schedules from the order list using his knowledge of the base layout; there is no documented formal procedure. The vehicles are radio dispatched to service these requests.

There is additional cargo movement which is not handled by the above method. At certain warehouses the high volume of cargo routinely shipped or received is moved by vehicles assigned exclusively for that purpose. These movements will not be scheduled by AVS initially.

Orders are serviced by four types of vehicles: straddle trucks, transporter vehicles, conventional tractor trailers, and industrial tractors. These vehicles will be designated in the remainder of this report by the abbreviations ST, TR, TT, and IT, respectively. These vehicles are distinguished by such operational characteristics as highway speed, load time, manner of loading, and the skills and ratings of the drivers who operate them.

**TABLE - NSC CHARLESTON WAREHOUSES SERVICED BY AVS  
LISTED BY GROUP AND NUMBER WITHIN GROUP**

Group			Group		
Num	Name(s)	Activity	Num	Names(s)	Activity
NORTH			WEST		
1	191	NSC	42	1501	NSC
2	1601a	"	43	1502	"
3	1601b	"	44	1503	"
4	1602	"	45	1507	"
5	1603	"	NSWT		
6	1604	"	46	80	USNSY
7	1605	"	47	117	"
8	1606	B279	48	1143	Spec Serv
9	1621	NSC	49	1199	USNSY
10	1622	"	NSYC		
11	1628	"	50	98	NSC
12	A	"	51	187	USNSY
13	1620	"	52	216	"
14	1157	"	53	1175	"
CENTR			53	1171	"
15	SM,45	Serve Mart	54	1169	"
16	46	6th Nav Dist	55	1171	"
17	53C	"	56	1172	S.O.A.P.
18	64E	NSC	57	1173	NSC
19	64W	"	58	1174	USNSY
20	66E	"	59	218	"
21	66W	"	NSYS		
22	67E	"	60	X10	AS17
23	67W	"	61	193	NSC
24	198	"	62	224	USNSY
25	1078	"	63	L	PIER
26	1127	"	64	M	"
27	1138	"	65	N	"
28	56	"	66	P	"
29	49	"	67	Q	"
30	SF	"	68	R	"
31	SFR	"	69	S	"
NSYN			70	T	"
32	2	USNSY	71	X20	"
33	3	"	SOUTH		
34	5	"	72	61	FBMTC
35	8	"	73	84	Comm.Ctr.
36	35	"	74	646	USNS
37	43C	"	75	647	"
38	44	"	76	655	Comm.Store
39	59	"	77	656	Navy Ex.
40	223	"	78	52	"

**TABLE (Continued)**

<u>Num</u>	<u>Group</u> <u>Name(s)</u>	<u>Activity</u>
	<b>MCRFT</b>	
80	1	Mine Craft
81	7	"
82	16	"
83	23	"
84	26	"
85	53S	"
	<b>X54</b>	
86	X54	Comm.Ctr.
	<b>OFF BASE</b>	
87	ABASE	Air base
88	NWS	Nav Weap Sta
89	DEYTN	Daytens SY
90	BRASW	Braswell SY
91	CSNWS	ComStoreNWS
92	BMEDC	Nav Hosp



## AVS1 - REGULAR ORDER SCHEDULING

order scheduling takes place in four phases:

Interactive data entry from a remote terminal  
(handled by subroutine VIP)

Examination and re-sequencing of input orders to reduce vehicle -  
order selection time (subroutine AVSIN)

Assembly of the four vehicle - type orders into route lists, i.e.,  
schedules (subroutine ROUTE)

Conversion of the vehicle route lists into readable schedules  
(subroutines TCARP and LPRNT).

is the AVS System Flowchart. The combined program, AVS, which  
AVS1 and AVS2, uses 52K words of memory.

ie specified input procedures are followed, the data input to AVS1  
ied interactively from a remote terminal. The user may enter the  
a:

ers are entered by listing the order identification numbers,\* the  
and the originating and destination warehouses. Data correctness  
displayed at the terminal.

ehicles are entered by listing the vehicle type, number of destina-  
ted for a route segment,\*\* capacity, and maximum route duration.  
either capacity or maximum route duration for any vehicle will cause  
n to substitute default (built-in) values.

The start time for the schedules must be entered. The program  
clock time.

.\_ A maximum value for route duration in minutes is entered.  
ill replace a default value of 480 minutes but does not supersede  
ecified in the vehicle entry.

---

nation required when 'C' option specified  
nation required for ST's and TR's.



VIP checks the input data for validity. An order's origin and destination warehouses must match a built-in list of warehouse names. Input numeric data (e.g., order size, times, vehicle capacity, and route duration) must be within specified ranges. When all input has been entered satisfactorily, AVS is executed.

#### METHOD and ALGORITHM

Route building is accomplished by subroutines ROUTE, BLDTR, and BUILDS. The schedules for ST's are built first, then for TR's, and TT's, and finally for IT's. The order of schedule building for the four vehicle types may be changed to fit the needs of the user. The algorithm operates on the sorted list of orders. In the following discussion the ST routes are built first, then the variations used in TR, TT, and IT route building.

The list of orders is scanned to determine the combination of orders which will, if serviced by a single vehicle, provide the greatest time saving (or least time cost) over the situation in which each order is serviced by a separate vehicle. There is almost always time saving involved in joining two or more orders with the same pick-up warehouse, the same delivery warehouse, or both. However, to prevent excessive order joining and over-utilization of the same vehicles, a greatest time savings restriction has been added to the algorithm. Since joined order routes are assigned to preferred vehicles first, the greatest time saving restriction reduces the number of joined orders and allows the assignment of single order routes to all available vehicles.

Having selected the best set of orders to start an ST's route, the algorithm examines the remaining orders in the list for that single order which, if joined to the route, results in the least time cost over servicing the order separately. As in the starting case the limit on time cost applies. The new order is placed at the end of the existing route, since examining intermediate positions along the route would be too time consuming and the coding would be overly complex.

The algorithm continues in this manner, adding orders to the end of the previous route, until the route time limit for the vehicle precludes further additions, or until the pool of unassigned orders is exhausted. In the latter case the algorithm proceeds directly to consideration of the TR vehicles. In



the former case the next ST route is begun, using the same method. ST routes are built using a "first on, first off" strategy.

TR, TT, and IT route building is exactly like ST route building and requires no additional elaboration. Leftover orders from TR route building are passed to the TT's and leftover TT orders are passed to IT's in the same manner that leftover ST orders are passed to TR's. Routes for TR's, TT's and IT's are built using a "first on, last off" scheme. Figures 3 and 4 show the pick-up and delivery sequence of orders that may be serviced by all vehicles. Figures 5 through 7 show the pick-up and delivery sequence of orders that may be serviced by each vehicle type.

Since TT's are the only vehicles equipped for highway travel, they alone service the six off-base activities.

Route building ceases when all IT routes have been built. If any orders are still unserved, they are printed out so that the dispatcher can schedule them at a later time. They may be scheduled later as "emergency" orders using program AVS2, they may be postponed to the next shift, or they may require special scheduling without the use of AVS.

#### PROGRAM OUTPUT

Schedule output from AVS1 consists of a summary of the input data and the schedules for the individual vehicles. Each schedule gives the vehicle name, route starting time, and dates in a header; a list of scheduled stops specifying site, time, pallets picked up or delivered, reference order number, and approximate stay time at the site; and a trailer of finishing time and location, and number of pallets moved. AVS1 also creates a system schedule file, TAPE1, to be used by AVS2.

+ PICK-UP  
 - DELIVERY  
 # ORDER  
 ○ WAREHOUSE  
 → DIRECTION

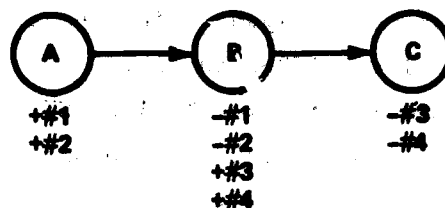


Figure 3 - All Vehicle Types, Order Allocations, Multiple Destinations

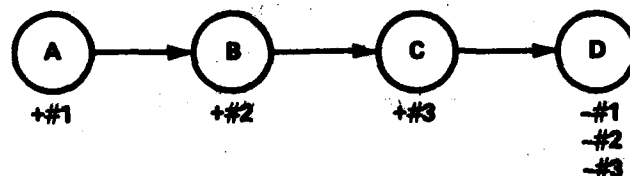


Figure 4 - All Vehicle Types, Order Allocations, One Destination

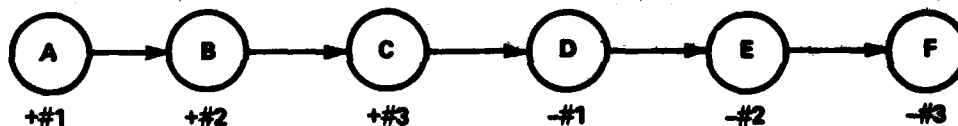


Figure 5 - Straddle Order Allocations, Multiple Destinations



Figure 6 - Transporters, Tractor Trailers and Industrial Tractors, Order Allocations, Multiple Destinations

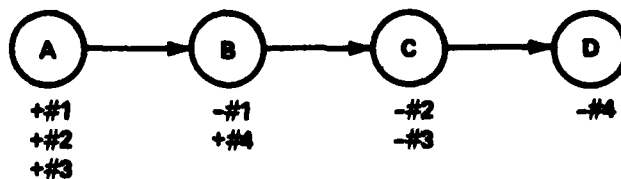


Figure 7 - Tractor Trailers and Industrial Tractors, Order Allocations, Multiple Destinations

## AVS2 - EMERGENCY ORDER SCHEDULING

The emergency order scheduling takes place in three phases:

- (1) Interactive data entry from a remote terminal (subroutines VIP and AVSN2)
- (2) Insertion of emergency orders into current vehicle-type order lists (subroutines ROUTE and TCARP)
- (3) Conversion of the vehicle route lists into readable schedules (subroutines TCARP and LPRINT)

### INPUT

AVS2 also uses VIP. Data items are entered interactively; VIP consolidates the data and makes the corrected results available to AVS2 on file, TAPE3. When data entry is complete, AVS is executed. Route data from the previous set of schedules, whether generated by AVS1 or by an earlier run of AVS2, are used by the program along with the current emergency order data as entered at the terminal. The following data are entered interactively:

Orders. The order origin, size, and destination are entered. Origin and destination are checked against a list of warehouse designations. Order size must be a numerical entry in the range 1-99 pallets. Up to 99 orders may be entered for emergency scheduling; if more than 99 are input, only the first 99 are retained.

Vehicles. A considerable choice of vehicles to service the emergency order is given to the user. All vehicles made available when the schedules were created by AVS1 (or augmented by earlier AVS2 runs) may be used; any subset of these may be chosen; or new vehicles may be selected. For new vehicles, the number of destinations permitted for a route segment, capacity, and maximum route duration may be specified; otherwise, default (built-in) values are used. New vehicles chosen by the algorithm to service the orders are added to the vehicles available for the next use of AVS2.

Time. The time of the emergency order is input. This time is the basis on which the existing schedules are examined to determine vehicle availability. Consequently, sufficient lead time should be allowed to permit the program to execute and the dispatcher to notify the selected driver of his change in route.

Date. It is possible during AVS2 to change the date stored in the AVS1 schedules.

Bump Option. A "bump" option can be exercised to allow the servicing of emergency orders before regular orders.

#### METHOD AND ALGORITHM

AVS2 examines the existing vehicle schedules and determines which vehicle or vehicles should service an emergency order. There is a fundamental assumption that the vehicles are, in fact, following the computer generated schedules fairly closely. This assumption allows AVS2 to work with schedule data rather than with real time data.

The criterion for determining which vehicle(s) service an emergency order is quite simple. The emergency vehicle selected is the one which can pick up the emergency order the soonest, subject to restrictions imposed by the algorithm options.

The "bump" option affects this criterion. Under the bump option the user may allow vehicles to exceed their specified maximum route duration. The default case for this option is not to allow it, so a vehicle which could service the emergency soonest would not be chosen if such an action meant that its regular route would not be finished on time. The bump option may be specified during interactive data entry. The term "bump" signifies that delivery of regular orders would be interrupted to handle the emergency. When time is clearly critical, specifying the bump option will enable the emergency order to receive the fastest possible service. If the bump option is not specified, and if the vehicles under consideration all have relatively full schedules, the program may inform the user that no vehicles are available to service the order.

An important feature of AVS2 is that the user may specify the vehicles to be considered, regardless of which vehicles were made available to the AVS1 algorithm. That is, the same vehicles may be used as were used for the previous schedules; or a subset of those vehicles may be used; or additional vehicles may be specified. This gives the dispatcher considerable control over the manner in which the program schedules the emergency order. As an extreme example, the user could specify a single truck which was already in use, and the bump option, to force the algorithm to fit the emergency order into the vehicle's schedule.

Several points about the AVS2 algorithm need to be mentioned. First, the emergency order algorithm may be used any number of times during the processing

of the AVS schedules. At the conclusion of each emergency run, the schedules are updated and stored on file, TAPE2, for use by the next run.

Second, but related to the first point, when the schedules are being searched for the placing of a new emergency order, no vehicle servicing a previous emergency order is available for the new order until the previous order is delivered. Emergency orders have a single priority, and are filled on a first come, first served basis.

This leads to a third point: emergency orders should be run in the order in which they are placed. Failure to do this may give erroneous results. Also the program will take a few minutes to run and print out, and this should be considered in specifying the start time for an emergency order.

Fourth, the actual updating of the schedules is not done automatically within the AVS2 program; consequently, if the schedules printed at the remote terminal do not satisfy the user, he may change options, vehicles, or even order data and rerun the program. Previous schedules may be saved or discarded by simple file handling commands given in the next section.

#### PROGRAM OUTPUT

Schedule output for AVS2 is straightforward. A summary of the input data is provided, then a vehicle availability table. Any vehicles which cannot be used are listed and the actual vehicle(s) chosen is (are) given. Finally the new schedules for the chosen vehicle(s) are printed, following the same format as in AVS1.

## INTERACTIVE DATA ENTRY AND SCHEDULE OUTPUT

There are four distinct phases in the execution of AVS:

- (1) Terminal and program call-up procedures
- (2) Data entry and validation
- (3) Schedule generation and output
- (4) Schedule verification and storage

These phases are described in this section and a sample printer terminal session is given to illustrate the use of the scheduler.

### TERMINAL AND PROGRAM CALL-UP PROCEDURES

The procedures for connecting the printer terminal by phone to the CDC 6600 at DTNSRDC, Carderock, MD are fixed by the system software and must be followed exactly. These procedures are quite straightforward, and the system will flag any errors for the user to correct.

#### Dial-Up Procedure

Although terminals may vary slightly in their configuration, the same dial-up procedure is applicable to all. The user dials the CDC 6600 at 202-227-3000 and listens for a high-pitched, continuous data tone. He then places the telephone hand-piece into the acoustic coupler at the back (typically) of the terminal and depresses the <RETURN>\* key to signal the computer that he is ready to log in on the system.

#### Login Procedure

The computer sends the following information to the terminal:

DTNSRDC 6600 INTERCOM V 4.7

DATE 2/19/81

TIME 09.00.00

The user must then identify himself using secure codes (User ID and Access Number) supplied by the Users' Services Branch, Code 189, DTNSRDC. He enters:

<LOGIN,XXXXXXXX,SUP> <RETURN>

---

\*The symbols, < >, indicate user action or enclose information to be entered by the user.

The X's must be replaced by his valid user ID. SUP suppresses the system status messages.

If this entry is correct, the computer responds with:

QQQQQQQQQ ENTER ACCESS NUMBER-

The print head is positioned in the area shown here by Q's. This area is actually overstruck several times to protect the user's access number.

If either the user ID or access number is wrong, the system will reply with a message and request the user to repeat the input. After three unsuccessful tries the system locks the user out and suggests that he seek help from User Services.

If both user ID and access number are entered correctly, the system asks for instructions by issuing a prompt:

COMMAND-

The user then proceeds with the next step of program call-up and initiation. After a successful login, the user prepares to run AVS by keying the following commands:

PROMPT	USER's COMMANDS	COMMENTS
COMMAND	<FETCH,AVS2RN>	Makes AVS available for terminal use
COMMAND	<CONNECT,INPUT,OUTPUT>	Allows data entry and printout at terminal
COMMAND	<AVS2RN>	Executes program

AVS now takes control of the terminal from the system and data are requested as outlined in the next section. An actual login and call-up session is given in the sample session.

#### DATA ENTRY AND VALIDATION

After Login and Call-up AVS prints the following message:

WELCOME TO AVS, AUTOMATED VEHICLE SCHEDULING

TODAY'S DATE IS 02/19/82

IF YOU WANT TO SEE A MENU, KEY 'M', IF NOT, KEY 'S'

---->

Entering anything but an M will suppress the menu listing. The entry of an M followed by a <RETURN> produces a list of possible AVS entries.

Here is the menu:

----> M

SELECT OPTIONS FROM THE FOLLOWING MENU:

- O --- ORDERS
- V --- VEHICLES
- D --- DATE (IF DIFFERENT FROM TODAY'S)
- B --- TIME AT WHICH ROUTES WILL BEGIN
- L --- MAX LENGTH OF ROUTES (ALL VEHICLES)
- T --- TERMINATE RUN
- BU --- SPECIAL ORDER BUMP OPTION
- E --- END OF DATA ENTRY; GENERATE SCHEDULES
  
- SP --- SPECIAL ORDER RUN (AVS2)
  
- C --- CHANGE/UPDATE OLD INPUT FILE
- LI --- LIST, FOLLOWED BY 'O' FOR ORDERS, 'V' FOR VEHICLES  
PARTIAL LIST OF ORDERS IS GIVEN BY:
  - LI O N1 N2 - LISTS ORDER N1 THRU N2
  - LI O LAST N - LISTS LAST N ORDERS
  - LI O N - LISTS NTH ORDER
- R --- REMOVE FOLLOWED BY O or 'V' AND A NUMBER

These options are described individually in the paragraphs that follow. The items selected may be entered in any order. Note that the program uses only the first few letters to discriminate among entries. However, longer entries (e.g., ORDERS instead of O and LIST instead of LI) may be used.

'O' Option (Orders)

The format for entering orders follows procedures now in use at Charleston. The format is:

<ORIGIN> <SIZE1> <DEST1> <SIZE2> <DEST2>... <RETURN>

where ORIGIN is the origination warehouse of the order

SIZE<sub>n</sub> is the number of pallets in the nth order

DEST<sub>n</sub> is the destination of the nth order in this line.

A list of origins and destinations available in the Charleston version is given in the Table. An example of order input is:



---><0>

INPUT ORDERS

---><1606 5 1172> <RETURN>

---><1606/ 2-198 / 7-1507 /1-SM> <RETURN>

Additional orders from 1606 could be entered on another line. Up to nine orders from each origin may be put on a single line. AVS allows a maximum of 99 orders. Words in an order must be separated by spaces, slashes (/), periods, or commas, and any number of these may separate two words. For clarity any of these separators may be used, but in practice it will probably be quickest to use only spaces.

Only valid orders are accepted by the program. The following error messages may result from incorrect entries:\*

UNRECOGNIZED ORIG -----> [name]

UNRECOGNIZED DESTINATION --> [name]

SIZE MUST BE NUMERIC-----> [value]

MAX ORDER IS 99 pallets---> [value]

ORIGIN AND DESTINATION ARE THE SAME ---> [name]

These error messages are self-explanatory. Incorrect data are ignored by the program, but the intended entries must be made again.

If the 'C' (change/update) option has been specified, the order format is:

<NUM> <ORIGIN> <SIZE> <DEST> <RETURN>

where NUM is the identification number of the order to be changed

ORIGIN is the (changed) origin warehouse of the order

SIZE is the (changed) number of pallets in the order

DEST is the (changed) destination of the order

If an order is to be added to the current list of orders, the same format is used and NUM may be any number from 1 to 99 which does not appear in the current order list. See 'C' (change/update) option.

---

\*The symbols, [ ], enclose information supplied by the AVS program.

### **'V' Option (Vehicles)**

Four types of vehicles are used at Charleston. The user must specify how many of each type of truck will be used in the scheduling algorithm. He may also specify the maximum number of deliveries per route segment for each truck (required for ST's and TR's), the capacity, and the maximum time limits. He need not specify every truck in the transportation fleet; AVS may be used to schedule only a portion of the total set of vehicles.

To begin vehicle specification, user enters V and the program responds with:

**INPUT VEHICLES**

—>

A vehicle entry has the form

**<N><TYPE><STOPS><CAPACITY><TIME LIMIT> <RETURN>**

where N is the number of vehicles with the listed characteristics, TYPE is the mnemonic code for the vehicles in the list (ST, TR, IT or TT), STOPS is the number of delivery stops allowed per route segment (used only with ST's and TR's), CAPACITY is the number of pallets the vehicle can hold, and TIME LIMIT is the maximum allowable route length for the vehicles in this entry. STOPS, CAPACITY, and TIME LIMIT are optional since each vehicle type has a default value: STOPS - 1, CAPACITY - 7 pallets for ST, 12 for TR, 14 for TT, 8 for IT. All vehicles have the same default time limit, either four hours or whatever was last entered in the L command. NOTE - at present STOPS must be specified whenever CAPACITY is given and CAPACITY must be specified whenever TIME LIMIT is, but CAPACITY may be specified without stating TIME LIMIT, and STOPS without stating CAPACITY.

#### **Examples of valid vehicle entries:**

- a) TT 12 235
- b) 2 ST 2 5 240
- c) 2 TR
- d) ST 5

Several vehicle entries may be entered on the same line, but they must be separated by a slash (/).

Example: 4 TT/2 ST 2

AVS does considerable data validation on the vehicle entries; errors in the vehicle data are much more consequential to the algorithm than errors in the other entries. Common typographical errors may be answered by one of these messages:

NUMERIC INPUT EXPECTED---> [bad entry]

VEHICLE ENTRY SKIPPED BECAUSE OF BAD DATA

AVS also checks the total number of vehicles of a type requested by the user against a maximum built into the program. When this maximum is exceeded, a message:

TOO MANY [xxxxxxx] THERE ARE [nn] LEFT

[mm] OF THE REQUESTED VEHICLE HAVE BEEN IGNORED

is printed. xxxxxxx is the type of vehicle, and nn + mm equals the number requested.

#### 'D' Option (Date)

The program obtains today's date from the computer system, so this entry need be made only if the schedules are to be generated for some date other than the current date. The user enters: D or DA or DATE, followed by a <RETURN>, informing the program that this is the date to be printed on the schedules. The program responds with a prompt (--->) and the user then enters a date in any of the following forms:

- a) DEC 18, 1978 or DECEMBER 18 78 etc.
- b) 12/18/78 or 121878 etc.
- c) 18 DEC 78 or 18 DEC 1978 or 18 DECEMBER 78 etc.

If an error is made, the program prints out:

DATE NOT VALID, TRY AGAIN

--->

Only the last entered date is retained by AVS.

#### 'B' Option (Begin Time)

This option is used to specify the time at which the schedules will start. The user enters B or BEGIN and a <RETURN>; the program responds:

ENTER BEGINNING TIME FOR ROUTES

--->

enters a valid start (in hours based on a 24-hour clock). Any  
t - e.g., alphabetic characters, etc. - results in the following

INPUT = [entry], TRY AGAIN

data can be entered at any time by requesting the 'B' option.

length)

s vehicle route schedules in accordance with the route duration  
) determined by the user.

rs: L

plies: ENTER MAX LENGTH OF ROUTE FOR ALL VEHICLES

—>

then enters the route length in minutes. Any error in input - e.g.,  
characters, etc., - results in the following message:

INPUT = [value], TRY AGAIN

ected data can be entered at any time by requesting the 'L' option.  
wing options control the execution of the AVS program.

Terminate Run)

on is used when the user wishes to terminate data entry and abort  
AVS run. Control is returned to the operating system.

(Bump)

tered under this option are given priority and are scheduled ahead  
ers not yet scheduled. This option may be used only with an emer-  
al) order run.

wing options enable the user to list and update the current input  
A provision is also made to allow the user to change or update the  
regular order run previously executed.

End of Data Entry)

ry of this option, the program prints a summary of the data entered,

**DATA ENTRY SUMMARY:**

DATE = [61882]  
BEGIN TIME = [800]  
MAX ROUTE = [240] MINS.  
[2] STRADDLES  
[0] TRANSPORTERS  
[0] TRACTOR TRAILERS  
[0] IND. TRACTORS  
[9] ORDER, 46 PALLETS  
IF INPUT IS NOT COMPLETE, TYPE 'MORE'  
IF NOT, TYPE ANYTHING ELSE-----><GO>

THIS CONCLUDES THE DATA ENTRY FOR AVS SCHEDULES  
SCHEDULES WILL BE PRINTED SOON: BE PATIENT

If an error or inconsistency shows up in the summary, typing <MORE> will allow the user to go back and make corrections or additional entries. If the data are accurate, any entry will start the next phase of the program, schedule generation and output.

If the 'C' option is not specified, the user should check carefully that the following minimal information has been entered:

- a) begin time
- b) at least one order
- c) at least one vehicle

When the data appear correct to the user, he enters <GO> and the scheduling begins.

**'SP' Option (Special Order Run)**

'SP' indicates that this run is an emergency or special order run, and all data necessary for this run must be entered. The 'C' options may not be used with an 'SP' request.

The system control statements for a Special Order run are as follows:

COMMAND - <FETCH,AVS2RN>

COMMAND - <ATTACH,TAPE1,PFNAME,ID=CARN>

(Where PFNAME is the permanent file name)

COMMAND - <CONNECT,INPUT,OUTPUT>

COMMAND - <AVS2RN>

### 'C' Option (Change/Update Input)

This option can be used only when changing or updating a previously executed regular order run. The file, TAPE1, of that run must be available. To initiate a 'C' option run, the following system control statements are used:

COMMAND - <FETCH,AVS2RN>

COMMAND - <FETCH,TAPE1> or <ATTACH,TAPE1,PFNAME,ID=CARN>

(Where PFNAME is the permanent file name)

COMMAND - <CONNECT,INPUT,OUTPUT>

COMMAND - <AVS2RN>

This option cannot be engaged with a special order run. See Sample Sessions.

### 'LI' Option (List)

Some of the errors commonly made in specifying the orders and vehicles to be used will look valid to AVS. For example, an order originating at warehouse 16 may accidentally be entered as 61, which is also a valid location to AVS. Errors of this type made in the date, length, or begin time (D, L, or B options) are easily corrected by entering the correct information. Vehicle and order entries, however, are lists and a means must be provided for specifying which element in the list is to be corrected. This provision is made in the LI (LIST) and R (REMOVE) commands.

The LI command gives a printout of either the vehicles or orders which have already been entered. The format LI V lists the vehicles, their capacities, and start times along with the numbers of delivery stops allowed per route segment are shown in the following example:

-->LI V ALL

#### VEHICLES

1 ST 7 240 2

2 ST 7 240 2

The analogous entry for listing orders is LI O, which prints out the orders giving a reference number, size, origin, and destination for each order. Since the listing of orders can be rather time consuming, a partial list feature for orders is available. The valid forms are:

LI O nn mm	List orders nn through mm, where nn and mm are the order reference numbers at the beginning and end of the desired segment of the list
LI O nn	List order nn, where nn is the order reference number
LI O LAST	List last order
LI O LAST mm	List last mm orders, where mm is the number of orders to be listed
LI O ALL	List all orders

#### 'R' Option (Remove)

Used in conjunction with the LI, O, and V options, the R option allows for the selective correction of order and vehicle entries. The formats are

R O nn and  
R V nn

where nn is the reference number supplied by the LI option. The (nn) entry is deleted from the list and the successive entries are renumbered to close the gap. Because of this renumbering it is wise to remove orders and vehicles in reverse numerical sequence (higher numbers first) to avoid inadvertently deleting the wrong entry. Once the erroneous entries have been removed from the list, correct data can be re-entered using the V or O commands.

#### SCHEDULE GENERATION AND OUTPUT

This phase of the program requires no action on the part of the user. Schedules are generated by the AVS algorithm and the results are printed. A sample printout of AVS, along with the Login, Call-up, and Data Entry phases, is given in the Sample Sessions Section. The output from AVS comprises a complete input data summary and the various vehicle schedules which have been generated.

Two possible errors may be flagged by AVS or the system in this phase:

1. If there are too many orders for the requested vehicles to handle, the program responds with a message such as:

\*\*\*\*\*

# ORDERS NOT MOVED

\*\*\*\*\*

[nn] PALLETS OF ORDER [mm] [ORIG] to [DEST]

Here, nn is the number of undelivered pallets, mm is a number given to the order during data entry, and ORIG and DEST refer to the origin and destination warehouses of that order.

2. If a relatively large number of orders has been entered (say 75-99), the program may run out of computer time. When this occurs, the system will print out the message:

CP TIME LIMIT EXCEEDED.

The program output, if any, is lost and the user must start over at the data entry phase.

## SCHEDULE VERIFICATION AND STORAGE

An example of AVS schedules is shown in the next section. The user should examine the output carefully to see that there are no problems. If he does not like some aspect of the schedules, they may be modified manually. On occasion there may be a problem which can be remedied by re-generating the schedules. After the last table has been printed, the terminal control returns to the system. Since AVS creates system schedule files, TAPE1 (Regular Orders) and TAPE2 (Special Orders), which may be used by future runs these files may be saved by the commands:

COMMAND - <STORE,TAPEN> <RETURN> or

COMMAND - <CATALOG,TAPEN,PFNAME,ID=CAXX> <RETURN>

(where TAPEN is TAPE1 or TAPE2, PFNAME is the permanent file name, and CAXX is the user's initial assigned by User's Services at DTNSRDC.)

If the user wishes to end the session, <LOGOUT> is entered after the system prompt. A summary of the time and charges for this terminal session are presented. The user can then disconnect the phone and turn off the terminal.



### **SAMPLE SESSIONS**

Schedule output from AVS consists of a summary of the input data, the schedules for the individual vehicles, and the unmoved order listings. Each schedule gives the vehicle name, route starting time, and dates in a header; a list of scheduled route segments specifying site, time, pallets picked up or delivered, order reference number, and approximate stay time at the site; and a trailer of finishing time and site, and number of pallets used. Runs showing the regular order, change/update, and special order options are included.

## LOGIN PROCEDURE

NSRDC 6600 INTERCOM V 4.7  
DATE 09/29/82  
TIME 08.31.55.  
login,carmelton,sup  
\*\*\*\*\* ENTER ACCESS NUMBER-  
COMMAND- fetch,avs2rn  
COMMAND- connect,input,output  
COMMAND- avs2rn  
VERSION 072480.1

## SAMPLE REGULAR ORDER RUN

WELCOME TO AVS, AUTOMATED VEHICLE SCHEDULING

TODAY'S DATE IS 09/29/82

IF YOU WANT TO SEE A MENU, KEY 'M', IF NOT KEY'S'

---->M

SELECT OPTIONS FROM THE FOLLOWING MENU:

O --- ORDERS  
V --- VEHICLES  
D --- DATE (IF DIFFERENT FROM TODAY'S)  
B --- TIME AT WHICH ROUTES WILL BEGIN  
L --- MAX LENGTH OF ROUTES (ALL VEHICLES)  
T --- TERMINATE RUN  
BU -- SPECIAL ORDER BUMP OPTION  
E --- END OF DATA ENTRY; GENERATE SCHEDULES  
  
SP -- SPECIAL ORDER RUN (AVS2)  
  
C --- CHANGE/UPDATE OLD INPUT FILE  
LI --- LIST, FOLLOWED BY 'O' FOR ORDERS. 'V' FOR VEHICLES  
FULL LIST OF ORDERS IS GIVEN BY 'LI O ALL'  
PARTIAL LIST OF ORDERS IS GIVEN BY:  
LI O N1 N2 - LISTS ORDERS N1 THRU N2  
LI O LAST N - LISTS LAST N ORDERS  
LI O N - LISTS NTH ORDER  
R --- REMOVE FOLLOWED BY 'O' OR 'V' AND A NUMBER

--->d

ENTER DATE

--->12 dec 83

--->b

ENTER BEGINNING TIME FOR ROUTES

--->0800

--->1

ENTER MAX LENGTH OF ROUTE FOR ALL VEHICLES

--->240

--->o

INPUT ORDERS

--->191 10 1601a/3 1601b/2 1157

--->sn 4 191/5 1601a/6 66w

--->224 10 16/5 49/8 1622

--->x20 12 x10/7 67w/2 sf

--->v

INPUT VEHICLES

--->1 st

--->1 tr

--->1 it

--->e

DATA ENTRY SUMMARY :

DATE = 121283

BEGIN TIME= 800

MAX ROUTE = 240 MINS.

1 STRADDLES

1 TRANSPRTS

0 TRCTR.TRLS

1 IND.TRCTRS

12 ORDER, 74 PALLETS

IF INPUT IS NOT COMPLETE, TYPE 'MORE'

IF NOT, TYPE ANYTHING ELSE ----->more

--->d

ENTER DATE

--->10 nov 82

--->e

**DATA ENTRY SUMMARY :**

DATE = 111082  
BEGIN TIME= 800  
MAX ROUTE = 240 MINS.

1 STRADDLES  
1 TRANSPRTS  
0 TRCTR.TRLS  
1 IND.TRCTRS

12 ORDER, 74 PALLETS  
IF INPUT IS NOT COMPLETE, TYPE 'MORE'  
IF NOT, TYPE ANYTHING ELSE ----->go

THIS CONCLUDES THE DATA ENTRY FOR AVS  
SCHEDULES WILL BE PRINTED SOON; BE PATIENT

-----  
AVS REGULAR ORDER PROGRAM  
-----

11/10/82

800.0

(OPT=+)

-----  
ORDERS  
-----

1	10 PALLETS FROM 191	TO 1601A
2	3 PALLETS FROM 191	TO 1601B
3	2 PALLETS FROM 191	TO 1157
4	4 PALLETS FROM SM	TO 191
5	5 PALLETS FROM SM	TO 1601A
6	6 PALLETS FROM SM	TO 66W
7	10 PALLETS FROM 224	TO 16
8	5 PALLETS FROM 224	TO 49
9	8 PALLETS FROM 224	TO 1622
10	12 PALLETS FROM X20	TO X10
11	7 PALLETS FROM X20	TO 67W
12	2 PALLETS FROM X20	TO SF

-----  
**VEHICLES SELECTED**  
 -----

1 VEHICLE ST 1 CAPACITY = 7 PLTS, DURATION = 240. MINS, 1 DEL STOPS  
 2 VEHICLE TR 1 CAPACITY = 12 PLTS, DURATION = 240. MINS, 1 DEL STOPS  
 3 VEHICLE IT 1 CAPACITY = 10 PLTS, DURATION = 240. MINS, 10 DEL STOPS

VEHICLE - ST 1  
 START TIME - 800.  
 DATE 111082

\*\*\*\*\*  
 STOP SITE TIME DELIVER PICK UP ORDER STAY TIME  
 \*\*\*\*\*

1	X20	812		7 PALLETS	11	3
2	67W	827	7 PALLETS		11	3
3	SH	832		6 PALLETS	6	3
4	66W	837	6 PALLETS		6	3
5	224	851		5 PALLETS	8	3
6	49	906	5 PALLETS		8	3
7	191	918		2 PALLETS	3	2
8	1157	922	2 PALLETS		3	2

ROUTE ENDED  
 LOCATION = 1078  
 TIME = 933  
 NO OF PALLETS MOVED = 20

VEHICLE - TR 1  
 START TIME - 800.  
 DATE 111082

```
*****
STOP SITE TIME DELIVER PICK UP ORDER STAY TIME
*****
```

1 X20	810		12 PALLETS	10	12
2 X10	823	12 PALLETS		10	12
3 X20	836		2 PALLETS	12	4
4 SF	849	2 PALLETS		12	4
5 SH	855		5 PALLETS	5	6
6 1601A	907	5 PALLETS		5	6
7 191	915		10 PALLETS	1	10
8 1601A	927	10 PALLETS		1	10
9 191	938		3 PALLETS	2	4
10 1601B	945	3 PALLETS		2	4
11 SH	956		4 PALLETS	4	5
12 191	1008	4 PALLETS		4	5
13 224	1033		10 PALLETS	7	10
14 16	1052	10 PALLETS		7	10
15 224	1111		8 PALLETS	9	8
16 1622	1140	8 PALLETS		9	8

ROUTE ENDED  
 LOCATION =1078  
 TIME = 1155  
 NO OF PALLETS MOVED = 54

```
*****
ORDERS NOT MOVED
*****
```

STOP  
 047700 MAXIMUM EXECUTION FL.  
 4.412 CP SECONDS EXECUTION TIME.  
 COMMAND- rewind,tape1 (INITIALIZE TAPE1 FOR NEXT RUN)  
 COMMAND- avs2rn

VERSION 072480.1

SAMPLE CHANGE/UPDATE RUN

WELCOME TO AVS, AUTOMATED VEHICLE SCHEDULING

TODAY'S DATE IS 09/29/82

IF YOU WANT TO SEE A MENU, KEY 'M', IF NOT KEY 'S'

--->s

--->c

CHANGE/UPDATE OLD INPUT FILE

--->d

ENTER DATE

--->12/03/82

--->1

ENTER MAX LENGTH OF ROUTE FOR ALL VEHICLES

--->480

--->o

INPUT ORDERS

--->10 x10 7 47e

--->1 191 20 1601b

--->e

DATA ENTRY SUMMARY :

DATE = 120582

BEGIN TIME= 0

MAX ROUTE = 480 MINS.

0 STRADDLES

0 TRANSPRTRS

0 TRCTR.TRLS

0 IND.TRCTRS

2 ORDER, 27 PALLETS

IF INPUT IS NOT COMPLETE, TYPE 'MORE'

IF NOT, TYPE ANYTHING ELSE ----->go

THIS CONCLUDES THE DATA ENTRY FOR AVS  
SCHEDULES WILL BE PRINTED SOON; BE PATIENT

-----  
**AVS SPECIAL ORDER PROGRAM**  
-----

12/5/82

800.0

-----  
**ORDERS**  
-----

1	20 PALLETS FROM 191	TO 1601B
2	3 PALLETS FROM 191	TO 1601B
3	2 PALLETS FROM 191	TO 1157
4	4 PALLETS FROM SM	TO 191
5	5 PALLETS FROM SM	TO 1601A
6	6 PALLETS FROM SM	TO 66W
9	8 PALLETS FROM 224	TO 1622
8	5 PALLETS FROM 224	TO 49
7	10 PALLETS FROM 224	TO 16
11	7 PALLETS FROM X20	TO 67W
12	2 PALLETS FROM X20	TO SF
10	7 PALLETS FROM X10	TO 67E

SPECIAL ORDER TIME = 800.

BUMP OPTION = NO

-----  
**VEHICLES SELECTED**  
-----

1 VEHICLE ST 1 CAPACITY = 7 PLTS, DURATION = 240. MINS, 1 DEL STOPS  
2 VEHICLE TR 1 CAPACITY = 12 PLTS, DURATION = 240. MINS. 1 DEL STOPS  
3 VEHICLE IT 1 CAPACITY = 10 PLTS, DURATION = 240. MINS, 10 DEL STOPS



VEHICLE - ST 1  
 START TIME - 800.  
 DATE 120582

```

*****
STOP SITE TIME DELIVER PICK UP ORDER STAY TIME
*****
1 X10 812 7 PALLETS 10 3
2 67E 827 7 PALLETS 10 3
3 X20 842 7 PALLETS 11 3
4 67W 857 7 PALLETS 11 3
5 SN 902 6 PALLETS 6 3
6 66W 907 6 PALLETS 6 3
7 224 922 5 PALLETS 8 3
8 49 936 5 PALLETS 8 3
9 191 948 3 PALLETS 2 3
4 PALLETS 1 1 *SPLIT
10 1601B 953 3 PALLETS 2 3
4 PALLETS 1 1 *SPLIT
11 191 958 7 PALLETS 1 3 *SPLIT
12 1601B 1003 7 PALLETS 1 3 *SPLIT
13 191 1008 7 PALLETS 1 3 *SPLIT
14 1601B 1014 7 PALLETS 1 3 *SPLIT
15 191 1019 2 PALLETS 1 2 *SPLIT
16 1601B 1023 2 PALLETS 1 2 *SPLIT
17 224 1048 7 PALLETS 7 3 *SPLIT
18 16 1102 7 PALLETS 7 3 *SPLIT
19 224 1116 3 PALLETS 7 3 *SPLIT
20 16 1129 3 PALLETS 7 3 *SPLIT

```

ROUTE ENDED  
 LOCATION =1078  
 TIME = 1158  
 NO OF PALLETS MOVED = 58

VEHICLE - TR 1  
START TIME - 800.  
DATE 120582

\*\*\*\*\*  
SITE TIME DELIVER PICK UP ORDER STAY TIME  
\*\*\*\*\*

SM	802		5 PALLETS	5	6
1601A	814	5 PALLETS		5	6
SM	827		4 PALLETS	4	5
191	839	4 PALLETS		4	5
X20	905		2 PALLETS	12	4
SF	918	2 PALLETS		12	4
224	931		8 PALLETS	9	8
1622	1000	8 PALLETS		9	8

ROUTE ENDED  
LOCATION =1078  
TIME = 1015  
NO OF PALLETS MOVED = 19

\*\*\*\*\*  
IS NOT MOVED  
\*\*\*\*\*

3, 2FROM .191 TO 1157

100 MAXIMUM EXECUTION FL.  
125 CP SECONDS EXECUTION TIME.  
rewind.tape1 (INITIALIZE TAPE1 FOR NEXT RUN)  
avs2rn  
ION 072480.1

SPECIAL ORDER RUN

IME TO AVS, AUTOMATED VEHICLE SCHEDULING

TODAY'S DATE IS 09/29/82

YOU WANT TO SEE A MENU, KEY 'M', IF NOT KEY'S'

--->s  
--->sp

SPECIAL ORDER RUN  
--->b

ENTER BEGINNING TIME FOR ROUTES  
--->0945  
--->1

ENTER MAX LENGTH OF ROUTE FOR ALL VEHICLES  
--->240  
--->o

INPUT ORDERS  
--->191 2 1157/5 67e/9 sm  
--->45 17 191/10 16  
--->v

INPUT VEHICLES  
--->1 st  
--->e

DATA ENTRY SUMMARY :

DATE = 92982  
BEGIN TIME= 945  
MAX ROUTE = 240 MINS.

1 STRADDLES  
0 TRANSPRTRS  
0 TRCTR.TRLS  
0 IND.TRCTRS

5 ORDER. 43 PALLETS  
IF INPUT IS NOT COMPLETE. TYPE 'MORE'  
IF NOT, TYPE ANYTHING ELSE ----->go

THIS CONCLUDES THE DATA ENTRY FOR AVS  
SCHEDULES WILL BE PRINTED SOON; BE PATIENT

-----  
AVS SPECIAL ORDER PROGRAM  
-----

11/10/82

800.0

-----  
ORDERS  
-----

1	2 PALLETS FROM 191	TO 1157
2	5 PALLETS FROM 191	TO 67E
3	9 PALLETS FROM 191	TO SM
4	17 PALLETS FROM SM	TO 191
5	10 PALLETS FROM SM	TO 16

SPECIAL ORDER TIME = 945.

BUMP OPTION = NO

-----  
VEHICLES SELECTED  
-----

1 VEHICLE ST 2 CAPACITY = 7 PLTS, DURATION = 240. MINS, 1 DEL STOPS

VEHICLE - ST 2  
 START TIME - 800.  
 DATE 111082

```

*****
STOP SITE TIME DELIVER PICK UP ORDER STAY TIME
*****
1 191 954 5 PALLETS 5 PALLETS 2 3 *SPCL*
2 67E 1005 5 PALLETS 2 3 *SPCL*
3 SM 1010 7 PALLETS 4 3 *SPCL*
4 191 1022 7 PALLETS 4 3 *SPCL*
5 SM 1034 7 PALLETS 4 3 *SPCL*
6 191 1046 7 PALLETS 4 3 *SPCL*
7 SM 1058 3 PALLETS 4 3 *SPCL*
8 191 1110 3 PALLETS 4 3 *SPCL*
9 191 1114 7 PALLETS 3 3 *SPCL*
10 SM 1126 7 PALLETS 3 3 *SPCL*
11 191 1138 2 PALLETS 3 2 *SPCL*
12 SM 1149 2 PALLETS 3 2 *SPCL*
13 SM 1153 7 PALLETS 5 3 *SPCL*
14 16 1220 7 PALLETS 5 3 *SPCL*
  
```

ROUTE ENDED  
 LOCATION = 1078  
 TIME = 1251  
 NO OF PALLETS MOVED = 38

```

*****
ORDERS NOT MOVED
*****
  
```

ORDER -101, 2FROM ,191 TO 1157  
 ORDER -105, 3FROM ,SM TO 16  
 STOP

051300 MAXIMUM EXECUTION FL.  
 4.150 CP SECONDS EXECUTION TIME.

COMMAND- store.tape1 (CATALOG TAPE1)  
 CT ID= CARN PFN=TAPE1  
 CT CY= 001 00000033 PRUS \$0000.06 /DAY  
 CT SN= SYSSET1  
 COMMAND- store.tape2 (CATALOG TAPE2)  
 CT ID= CARN PFN=TAPE2  
 CT CY= 001 00000033 PRUS \$0000.06 /DAY  
 CT SN= SYSSET1  
 COMMAND- logout  
 CPA 25.039 SEC  
 SS 26.695 SEC

**SPECIAL ORDER RUN USING TAPE1**

NSRDC 6600 INTERCOM V 4.7  
DATE 09/29/82  
TIME 13.33.55.  
LOGIN,CARNMELTON,SUP  
##### ENTER ACCESS NUMBER-  
COMMAND- FETCH,AVS2RN  
COMMAND- FETCH,TAPE1  
COMMAND- CONNECT,INPUT,OUTPUT  
COMMAND- AVS2RN  
VERSION 072480.1

**WELCOME TO AVS, AUTOMATED VEHICLE SCHEDULING**

**TODAY'S DATE IS 09/29/82**

**IF YOU WANT TO SEE A MENU, KEY 'M', IF NOT KEY'S'**

--->S  
--->0

INPUT ORDERS  
--->1601A 10 191/4 SM/6 49/2 SF  
--->224 17 X20/3 X10  
--->SP

SPECIAL ORDER RUN  
--->V

INPUT VEHICLES  
--->1 ST  
--->B

ENTER BEGINNING TIME FOR ROUTES  
--->1000  
--->L

ENTER MAX LENGTH OF ROUTE FOR ALL VEHICLES  
--->240  
--->E

**DATA ENTRY SUMMARY :**

DATE = 92982  
BEGIN TIME= 1000  
MAX ROUTE = 240 MINS.

1 STRADDLES  
0 TRANSPRTS  
0 TRCTR.TRLS  
0 IND.TRCTRS

6 ORDER, 42 PALLETS  
IF INPUT IS NOT COMPLETE. TYPE 'MORE'  
IF NOT, TYPE ANYTHING ELSE ----->GO

THIS CONCLUDES THE DATA ENTRY FOR AVS  
SCHEDULES WILL BE PRINTED SOON; BE PATIENT

-----  
**AVS SPECIAL ORDER PROGRAM**  
-----

11/10/82

800.0

-----  
**ORDERS**  
-----

1	10 PALLETS FROM 1601A	TO 191
2	4 PALLETS FROM 1601A	TO SM
3	6 PALLETS FROM 1601A	TO 49
4	2 PALLETS FROM 1601A	TO SF
5	17 PALLETS FROM 224	TO X20
6	3 PALLETS FROM 224	TO X10

SPECIAL ORDER TIME = 1000.

DUMP OPTION = NO

-----  
VEHICLES SELECTED  
-----

1 VEHICLE ST 2 CAPACITY = 7 PLTS, DURATION = 480. MINS, 1 DEL STOPS

VEHICLE - ST 2  
START TIME - 800.  
DATE 111082

\*\*\*\*\*  
STOP SITE TIME DELIVER PICK UP ORDER STAY TIME  
\*\*\*\*\*

1	1601A	1009		6 PALLETS	3	3 *SPCL*
2	49	1020	6 PALLETS		3	3 *SPCL*
3	1601A	1032		4 PALLETS	2	3 *SPCL*
4	SH	1044	4 PALLETS		2	3 *SPCL*
5	224	1058		7 PALLETS	5	3 *SPCL*
6	X20	1103	7 PALLETS		5	3 *SPCL*
7	224	1108		7 PALLETS	5	3 *SPCL*
8	X20	1114	7 PALLETS		5	3 *SPCL*
9	224	1119		3 PALLETS	6	3 *SPCL*
10	X10	1123	3 PALLETS		6	3 *SPCL*
11	224	1127		3 PALLETS	5	3 *SPCL*
12	X20	1132	3 PALLETS		5	3 *SPCL*
13	1601A	1157		7 PALLETS	1	3 *SPCL*
14	191	1202	7 PALLETS		1	3 *SPCL*
15	1601A	1207		3 PALLETS	1	3 *SPCL*
16	191	1211	3 PALLETS		1	3 *SPCL*
17	1601A	1216		2 PALLETS	4	2 *SPCL*
18	8F	1227	2 PALLETS		4	2 *SPCL*

ROUTE ENDED  
LOCATION = 1078  
TIME = 1231  
NO OF PALLETS MOVED = 42



\*\*\*\*\*  
ORDERS NOT MOVED  
\*\*\*\*\*

STOP  
051300 MAXIMUM EXECUTION FL.  
4.465 CP SECONDS EXECUTION TIME.  
COMMAND- LOGOUT  
CPA 8.720 SEC  
SS 9.294 SEC  
EST. SYSTEM COST \$ .96  
EST. CONNECT COST \$ 0.83  
CONNECT TIME 0 HRS. 10 MIN.  
09/29/82 LOGGED OUT AT 13.44.48.

SPECIAL ORDER RUN USING TAPE2

<LOGIN,CARNHELTON,SUP  
\*\*\*\*\* ENTER ACCESS NUMBER-  
COMMAND- FETCH,AVS2RN  
COMMAND- ATTACH,TAPE1,TAPE2.ID=CARN  
AT CY= 001 SN=SYSSET1  
COMMAND- CONNECT,INPUT,OUTPUT  
COMMAND- AVS2RN  
VERSION 072480.1

WELCOME TO AVS, AUTOMATED VEHICLE SCHEDULING

TODAY'S DATE IS 09/29/82

IF YOU WANT TO SEE A MENU, KEY 'M', IF NOT KEY'S'

--->S  
--->SP

SPECIAL ORDER RUN  
--->B

ENTER BEGINNING TIME FOR ROUTES  
--->1005  
--->L

ENTER MAX LENGTH OF ROUTE FOR ALL VEHICLES

--->240

--->0

INPUT ORDERS

--->16 10 SM/8 224/4 X10

--->1173 10 SM/5 SF

--->V

INPUT VEHICLES

--->1 ST

--->1 TR

--->E

DATA ENTRY SUMMARY :

DATE = 92982

BEGIN TIME= 1005

MAX ROUTE = 240 MINS.

1 STRADDLES

1 TRANSPRTS

0 TRCTR.TRLS

0 IND.TRCTRS

5 ORDER, 37 PALLETS

IF INPUT IS NOT COMPLETE, TYPE 'MORE'

IF NOT, TYPE ANYTHING ELSE ----->GO

THIS CONCLUDES THE DATA ENTRY FOR AVS  
SCHEDULES WILL BE PRINTED SOON; BE PATIENT

-----  
AVS SPECIAL ORDER PROGRAM  
-----

11/10/82

800.0

-----  
ORDERS  
-----

6	10 PALLETS FROM 16	TO SM
7	8 PALLETS FROM 16	TO 224
8	4 PALLETS FROM 16	TO X10
9	10 PALLETS FROM 1173	TO SM
10	5 PALLETS FROM 1173	TO SF

SPECIAL ORDER TIME = 1005.

DUMP OPTION = NO

-----  
VEHICLES SELECTED  
-----

1 VEHICLE ST 3 CAPACITY = 7 PLTS, DURATION = 240. MINS, 1 DEL STOPS  
2 VEHICLE TR 2 CAPACITY = 12 PLTS, DURATION = 240. MINS, 1 DEL STOPS

VEHICLE - ST 3  
START TIME - 800.  
DATE 111082

```
*****
STOP SITE TIME DELIVER PICK UP ORDER STAY TIME
*****
1 1173 1014 5 PALLETS 10 3 *SPCL*
2 SF 1025 5 PALLETS 10 3 *SPCL*
3 SH 1030 3 PALLETS 5 3 *SPCL*
4 16 1058 3 PALLETS 5 3 *SPCL*
5 191 1127 2 PALLETS 1 2 *SPCL*
6 1157 1132. 2 PALLETS 1 2 *SPCL*
```

ROUTE ENDED  
LOCATION =1078  
TIME = 1143  
NO OF PALLETS MOVED = 10

VEHICLE - TR 2  
 START TIME - 800.  
 DATE 111082

```

*****
STOP SITE TIME DELIVER PICK UP ORDER STAY TIME
*****
1 1173 1012 10 PALLETS 9 10 *SPCL*
2 SM 1028 10 PALLETS 9 10 *SPCL*
3 16 1102 8 PALLETS 7 8 *SPCL*
4 224 1119 8 PALLETS 7 8 *SPCL*
5 16 1136 4 PALLETS 8 5 *SPCL*
6 X10 1150 4 PALLETS 8 5 *SPCL*
7 16 1204 10 PALLETS 6 10 *SPCL*
8 SM 1238 10 PALLETS 6 10 *SPCL*
  
```

ROUTE ENDED  
 LOCATION =1078  
 TIME = 1249  
 NO OF PALLETS MOVED = 32

```

*****
ORDERS NOT MOVED
*****
  
```

STOP  
 051300 MAXIMUM EXECUTION FL.  
 6.004 CP SECONDS EXECUTION TIME.  
 COMMAND- LOGOUT  
 CPA 9.772 SEC  
 SS 10.343 SEC  
 EST. SYSTEM COST \$ 1.08  
 EST. CONNECT COST \$ 0.50  
 CONNECT TIME 0 HRS. 6 MIN.  
 09/29/82 LOGGED OUT AT 13.51.47.

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